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10/539,622	06/17/2005	Bruno Le Breton	4590-425	4601

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EXAMINER	
PATEL, DHAVAL V	

ART UNIT	PAPER NUMBER
2611	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/539,622	LE BRETON ET AL.	
	Examiner	Art Unit	
	DHAVAL PATEL	2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *19 March 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *2 and 4-15* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *2 and 4-15* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments with respect to claims have been considered but are moot in view of the new ground(s) of rejection.

2. Examiner has acknowledged cancelled claims 17 and 18.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in **Graham v. John Deere Co., 383 U.S. 1, 148 USPQ 459 (1966)**, that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows: ***(See MPEP Ch. 2141)***

a. Determining the scope and contents of the prior art;
b. Ascertaining the differences between the prior art and the claims in issue;
c. Resolving the level of ordinary skill in the pertinent art; and
d. Evaluating evidence of secondary considerations for indicating obviousness or nonobviousness.

4. **Claims 2 and 4-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Laamanen et al. (WO/98/58471) (see IDS) in view of Kumar et al. (US 7,046,694)(hereafter Kumar).**

Regarding claims 2 and 8, Laamanen discloses a method and apparatus of modulating a digital signal of width L in frequency on a given useful frequency band comprising:

a separation of separating the digital signal into N blocks b. (1< n <N) (page 3, lines 1-5),

splitting the given useful frequency band into N contiguous parts pn (page 4, lines 2, lines 23-25, sub channels in multi-carrier system),

each block of digital signals bn over the associated channel Cn (page 3, lines 1-5 and lines 14-15).

distributing each block of digital signal bn over the associated channel (page 5, lines 8-13 and multi-carrier system).

wherein the channels Cn are defined by taking account of a predetermined minimum distance between the channels (page 4, lines 9-11).

Furthermore, Laamanen discloses that the sub channels of a multi-carrier system may be allocated equal or unequal bandwidths (claimed as different bandwidth) and they can be spaced apart (claimed as frequency bands or channels are separated) over the frequency spectrum. Also, it is well-known to one of ordinary skilled in the art would easily recognized that any multi carrier system such as OFDM or DMT system would have this kind of structure having separating the bandwidth into sub carriers and transmit the information or data on individual sub carriers and are spaced art to mitigate the frequency selective fading.

But, Laamanen does not explicitly disclose wherein the channels Cn are defined by taking account of a predetermined minimum distance between the channels to allow a predetermined maximum number of blocks to be affected by the phenomenon of flat fading, wherein the predetermined minimum distance between the channels is determined as a function of the number N of channels, of their width In, and of a mean width of the frequency band affected by the phenomenon of flat fading.

In the same field of endeavor, Kumar teaches DAB system and provided the OFDM system. Col. 19 lines 42-50 teaches that the antennas are separated by a distance which is about one-half of the RF carrier wavelength (frequency), so here, there is a relationship between the distance and bandwidth. Col. 22 lines 25-35 also teaches that the DAB signal which is composed of a 48 modulated orthogonal signals (number of sub carriers which is orthogonal so there is relationship between number of channel an distance), which is sub carrier signals, spans a bandwidth of about 450 KHZ (width of the sub channels), centered on the analog FM band center frequency. The sub carrier frequency spectrum has about a 220 KHZ void in the center, the void in the center to be approximately frequency orthogonal to the analog FM band signal. Furthermore, col. 23 lines 60-67 teaches that in COFDM system, a plurality of orthogonal sub-carriers signals are transmitted. Because the bandwidth of each sub carrier is narrow, the effects of multi-path fading may be modeled as a flat-fade for each sub carrier when the multi-path has secular characteristics (so, here also, bandwidth (width) of sub carriers (which are orthogonal based on distance apart) is considered into flat fading).

Therefore, it would have been obvious to one of ordinary skilled in the art at the time of the invention, to combine the teachings of Kumar and Laamanen, as a whole, so as to define the channels with the predetermined distance to become orthogonal sub carries and modeled the fading as a flat-fade based on the spacing and width of the sub carriers, the motivation is to combat the deleterious effects of the fading (col. 32 lines 25-28).

Regarding claim 4, the combined teachings of Lammanen and Wright do not explicitly discloses the method of modulation comprising:

determining the minimum distance between the channels, the minimum distance being determined as a function of the number N of channels, of their width In, and of the mean width of the frequency band affected by the phenomenon of flat fading. The method of modulation wherein the minimum distance is determined such that minorities of channels Cn are affected by the phenomenon of fiat fading.

In the same field of endeavor, Kumar teaches DAB system and provided the OFDM system. Col. 19 lines 42-50 teaches that the antennas are separated by a distance which is about one-half of the RF carrier wavelength (frequency), so here, there is a relationship between the distance and bandwidth. Col. 22 lines 25-35 also teaches that the DAB signal which is composed of a 48 modulated orthogonal signals, which is sub carrier signals, spans a bandwidth of about 450 KHZ, centered on the analog FM band center frequency. He sub carrier frequency spectrum has abut a 220

KHZ void in the center, the void in the center to be approximately frequency orthogonal to the analog FM band signal. Furthermore, col. 23 lines 60-67 teaches that in COFDM system, a plurality of orthogonal sub-carriers signals are transmitted. Because the bandwidth of each sub carrier is narrow, the effects of multi-path fading may be modeled as a flat-fade for each sub carrier when the multi-path has secular characteristics.

Therefore, it would have been obvious to one of ordinary skilled in the art at the time of the invention, to combine the teachings of Kumar and Laamanen, as a whole, so as to define the channels with the predetermined distance to become orthogonal sub carries and modeled the fading as a flat-fade based on the spacing and width of the sub carriers, the motivation is to combat the deleterious effects of the fading (col. 32 lines 25-28).

Regarding claims 5, Lammanen further discloses the method of modulation as claimed in the claim 1, wherein the channels Cn are of identical widths equal to an Nth of the width of the digital signal L: In = L/N, 1<n<N (page 4, lines 9-13).

Regarding claim 6, Lammanen and Wright do not explicitly discloses The method of digital modulation as claimed in the claim 1 wherein: the digital signal is separated into N = 2 blocks b, the given useful frequency band is split into N = 2 parts pn, the first block bl is distributed over a channel Cl of width L/2 lying within the first part Pl of the given useful frequency band and the second block bl is distributed over a

channel C2 of width L/2 lying within the second part P2 of the given useful frequency band.

However, Lammnen discloses that the sub channels of a multi carrier system may be allocated equal bandwidths in the frequency spectrum and they can be space at equal or unequal distance from each other over the frequency spectrum. One of ordinary skilled in the art would easily recognized that the frequency band could be split into two bands instead of N bands so that two blocks of data could be modulated to the two sub bands. Furthermore, both bands are separated. Wright discloses that user data can be transferred within one sub and using one particular channel.

Therefore, it would have been obvious to one of ordinary skilled in the art at the time of the invention to combine the teachings of Wright, into the system of Lammenen, so as to use the particular channel within first sub band to transfer first block of data and second channel within second sub band, separated by equal distance, to transfer the second block of data, the motivation is adaptive bandwidth allocation and less complexity.

Regarding claim 7, Kumar further discloses the method of modulation as claimed wherein the given useful frequency band is FM band (col.3 lines 40-45).

Regarding claim 9, Lammenen discloses a demodulator of digital signals conveyed on a given useful frequency band by a transmitter comprising a modulator (Fig. 3, modulator multiplexing incoming data into the sub carrier) comprising:

means of scanning N blocks bn of signals distributed over these channels (Fig. 3, channel),

means of recombination of the channels into a digital signal g[m] (Fig. 3, recombined multiple parallel channel data d1..dn).

wherein said modulator comprises:

means for separating of separating the digital signal into N blocks b. (1< n <N) (Fig. 9, page 3, lines 1-5),

means for splitting the given useful frequency band into N contiguous parts pn (Fig. 9, page 4, lines 2, lines 23-25, sub channels in multi-carrier system),

means for defining channel of width ln in frequency lying within the associated part Pn (Fig. 9, page 3, lines 1-5 and lines 14-15).

means for distributing each block of digital signal bn over the associated channel (Fig. 9, page 5, lines 8-13 and multi-carrier system).

wherein the channels Cn are defined by taking account of a predetermined minimum distance between the channels (Fig. 9, page 4, lines 9-11).

Furthermore, Laamnen discloses that the sub channels of a multi-carrier system may be allocated equal or unequal bandwidths (claimed as different bandwidth) and

they can be spaced apart (claimed as frequency bands or channels are separated) over the frequency spectrum. Also, it is well-known to one of ordinary skilled in the art would easily recognized that any multi carrier system such as OFDM or DMT system would have this kind of structure having separating the bandwidth into sub carriers and transmit the information or data on individual sub carriers and are spaced art to mitigate the frequency selective fading.

But, Laamanen does not explicitly disclose wherein the channels Cn are defined by taking account of a predetermined minimum distance between the channels to allow a predetermined maximum number of blocks to be affected by the phenomenon of flat fading, wherein the predetermined minimum distance between the channels is determined as a function of the number N of channels, of their width In, and of a mean width of the frequency band affected by the phenomenon of flat fading.

In the same field of endeavor, Kumar teaches DAB system and provided the OFDM system. Col. 19 lines 42-50 teaches that the antennas are separated by a distance which is about one-half of the RF carrier wavelength (frequency), so here, there is a relationship between the distance and bandwidth. Col. 22 lines 25-35 also teaches that the DAB signal which is composed of a 48 modulated orthogonal signals, which is sub carrier signals, spans a bandwidth of about 450 KHZ, centered on the analog FM band center frequency. He sub carrier frequency spectrum has abut a 220 KHZ void in the center, the void in the center to be approximately frequency orthogonal to the analog FM band signal. Furthermore, col. 23 lines 60-67 teaches that in COFDM system, a plurality of orthogonal sub carriers signals are transmitted. Because the bandwidth of

each sub carrier is narrow, the effects of multipath fading may be modeled as a flat-fade for each sub carrier when the multipath has secular characteristics.

Therefore, it would have been obvious to one of ordinary skilled in the art at the time of the invention, to combine the teachings of Kumar and Laamanen, as a whole, so as to define the channels with the predetermined distance to become orthogonal sub carries and modeled the fading as a flat-fade based on the spacing and width of the sub carriers, the motivation is to combat the deleterious effects of the fading (col. 32 lines 25-28).

Regarding claims 10 and 15, the combined teachings of both Lammanen and Kumar discloses transmission of digital signals comprising a modulator (Kumar, Fig. 5, sub carrier group modulator, 47 and 57 and combiner 59) and error corrector (Fig. 4, ECC encoder, 41) and error corrector (Fig. 4, 41) is conveying the coded signal to the modulator for transmission (Fig. 4, sub carrier modulation, 47 and 57), Kumar further discloses transmitter conveying digital signals in the FM band (Fig. 4, FM band)

Regarding claim 11, the combined teachings of both Lammanen and Kumar disclose the transmitter wherein the transmission chain comprises an interleaver placed between the error corrector coder and the modulator (Kumar teaches interleaver (Fig. 1, interleaver, 43) in transmitter, placed between error corrector coder (Fig. 1, ECC, 41) and modulator (Fig. 4, modulator, 47 and 57).

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Regarding claim 12, the combined teachings of Lammenen and kumar disclose the transmitter as claimed in the claim 10, wherein a distinct set of channels {Cqn} is associated with each of the Q transmission chains (Kumar teaches wherein a distinct set of channels {Cqn} is associated with each of the Q transmission chains (Fig. 4 and 5, sub carrier modulator).

Regarding claims 13 and 14, A receiver of digital signals conveyed on a given useful frequency band by a transmitter comprising a demodulator

wherein said transmitter (Fig. 3, transmitter) of the digital signals on the given useful frequency band (Fig. 3, page 12, lines 5-11, frequency range) comprising at least one transmission chain comprising a modulator (Fig. 3, modulator) of the digital signals over the given useful frequency band (Fig. 3, page 12, lines 5-11, frequency range)implementing a method of modulation (page 4, lines 10-15, DMT modulation),

a separation of separating the digital signal into N blocks b. (1< n <N) (page 3, lines 1-5),

splitting the given useful frequency band into N contiguous parts pn (page 4, lines 2, lines 23-25, sub channels in multi-carrier system),

each block of digital signals bn over the associated channel Cn (page 3, lines 1-5 and lines 14-15).

distributing each block of digital signal bn over the associated channel (page 5, lines 8-13 and multi-carrier system).

wherein the channels Cn are defined by taking account of a predetermined minimum distance between the channels (page 4, lines 9-11).

Wherein wherein said demodulator of digital signals conveyed on the given useful frequency band by the transmitter comprising the modulator of the digital signals over the given useful frequency band implementing the method of modulation a-s claimed in claim 8, comprising:

means of scanning of the N channels Cn enabling reading of the N blocks bn of signals distributed over these channels(Fig. 3, channels must be detected at the receiver or scanned to detect the arrival of transmitted signals),

means of recombination of the N blocks read bn in the N channels

into a digital signal s[m] (Fig. 3, recombined multiple parallel channel data d1..dn).

Furthermore, Laamnen discloses that the sub channels of a multi-carrier system may be allocated equal or unequal bandwidths (claimed as different bandwidth) and they can be spaced apart (claimed as frequency bands or channels are separated) over the frequency spectrum. Also, it is well-known to one of ordinary skilled in the art would easily recognized that any multi carrier system such as OFDM or DMT system would have this kind of structure having separating the bandwidth into sub carriers and transmit the information or data on individual sub carriers and are spaced art to mitigate the frequency selective fading.

But, Laamanen does not explicitly disclose wherein the channels Cn are defined by taking account of a predetermined minimum distance between the channels to allow a predetermined maximum number of blocks to be affected by the phenomenon of flat fading, wherein the predetermined minimum distance between the channels is determined as a function of the number N of channels, of their width In, and of a mean width of the frequency band affected by the phenomenon of flat fading, Furthermore, Laamanen does not explicitly disclose error corrector coder at the modulation side and a decoder associated with the error correction coder of the transmitter receiving the digital signal recombined by the demodulator wherein the given useful frequency band is FM band.

In the same field of endeavor, Kumar teaches DAB system and provided the OFDM system. Col. 19 lines 42-50 teaches that the antennas are separated by a distance which is about one-half of the RF carrier wavelength (frequency), so here, there is a relationship between the distance and bandwidth. Col. 22 lines 25-35 also teaches that the DAB signal which is composed of a 48 modulated orthogonal signals, which is sub carrier signals, spans a bandwidth of about 450 KHZ, centered on the analog FM band center frequency. He sub carrier frequency spectrum has abut a 220 KHZ void in the center, the void in the center to be approximately frequency orthogonal to the analog FM band signal. Furthermore, col. 23 lines 60-67 teaches that in COFDM system, a plurality of orthogonal sub carriers signals are transmitted. Because the bandwidth of each sub carrier is narrow, the effects of multipath fading may be modeled as a flat-fade for each sub carrier when the multipath has secular characteristics. Kumar

teaches a receiver (Fig. 11) of digital signals conveyed on a given useful frequency band by a transmitter (Fig. 2) comprising a deinterleaver (Fig. 9, de-interleaver, 221) associated with the interleaver (Fig. 4, interleaver, 43) of the transmitter (Fig. 4) receiving the digital signal recombined g[rn] (Fig. 5, subcarrier group modulator and combined and FIg. 10, demodulator, 295, parallel to serial converter, 298) by the demodulator (Fig. 9,213), a decoder (Fig. 9,bit estimator, 231, Fig. 12, ECC decoder, 335) associated with the error corrector coder (Fig. 4, ECC encoder, 41) of the transmitter (Fig. 4) receiving the digital signal recombined (Fig. 9 and Fig. 10, recombined demodulated signal and parallel to serial converter, 298) deinterleaved c[m] by the deinterleaver (Fig. 9, deinterleaver, 221), Wherein the given useful frequency band is the FM band (col. 40 lines 44-60, generating FM band signal).

Therefore, it would have been obvious to one of ordinary skilled in the art at the time of the invention, to combine the teachings of Kumar and Laamanen, as a whole, so as to define the channels with the predetermined distance to become orthogonal sub carriers and modeled the fading as a flat-fade based on the spacing and width of the sub carriers and modulating and demodulating those channels in FM band with necessary communication components such as error correction coding and interleaving , the motivation is to combat the deleterious effects of the fading (col. 32 lines 25-28).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Patel Dhaval whose telephone number is (571) 270-1818. The examiner can normally be reached on M-F 8:30-6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shuwang Liu can be reached on (571) 272-3036. Customer Service can be reached at (571) 272-2600. The fax number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

//Dhaval Patel/

Examiner, Art Unit 2611

4/10/2009

/Shuwang Liu/

Supervisory Patent Examiner, Art Unit 2611